

**A TAXONOMIC STUDY OF THE MICRO-LEPIDOPTERAN  
GENERA *MICROCALYPTRIS* BRAUN AND *FOMORIA* BEIRNE  
OCCURRING IN THE UNITED STATES OF AMERICA  
(LEPIDOPTERA, NEPTICULIDAE)**

by

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With 26 text-figures

**ABSTRACT**

The nearctic species of two genera of leaf-mining microlepidoptera are here revised as a prelude to a revision of the North American Nepticulidae. The concept of *Microcalyptris* Braun is widened from what was known as a monotypic genus to one having eight species.

*Fomoria* Beirne can no longer be regarded as solely Palaearctic for here the true relationship of two species is shown in their transfer from "*Nepticula*" von Heyden. Generic and species diagnoses, key, descriptions, and details of genitalia are given where necessary.

**INTRODUCTION**

In this revision eight species of *Microcalyptris* are discussed, of which two have been transferred from "*Nepticula*" von Heyden and five are new species, three of which are named and described here. Until last year *Microcalyptris* was known as a monotypic genus from a single specimen.

The genus *Fomoria* contains two species in North America and these, too, are transferred from "*Nepticula*" von Heyden and presented as new combinations here.

**ABBREVIATIONS**

L. A. Co. M.	Los Angeles County Museum of Natural History, California, USA.
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington D. C., USA.
ANS	Academy of Natural Sciences, Philadelphia, USA.
MCZ	Museum of Comparative Zoology, Cambridge, Massachusetts, USA.
CNC	Canadian National Collection, Ottawa, Canada.
FUA	Free University of Amsterdam, Netherlands.

The methods and abbreviations used are similar to those given in Wilkinson &

Scoble (1979: 2), except that the letters ANS are used to mean the Academy of Natural Sciences, Philadelphia, USA.

Scale lines on figs. are 0.1 mm unless stated otherwise.

### **Microcalyptris Braun, 1925**

*Microcalyptris* Braun, 1925b: 224. Type species by monotypy: *Microcalyptris scirpi* Braun, 1925b: 225.

The genus shows one of the more simple patterns of venation found in the family Nepticulidae. Other features characteristic of the genus are the peculiar lateral arms associated with the vinculum and probably part of the gnathos; the very slender valves; and the juxta, which is extremely complex in some cases. The female genitalia often show complex sclerotisations of the ductus with the signa, usually, as linear rows of plates or single spiculate cells.

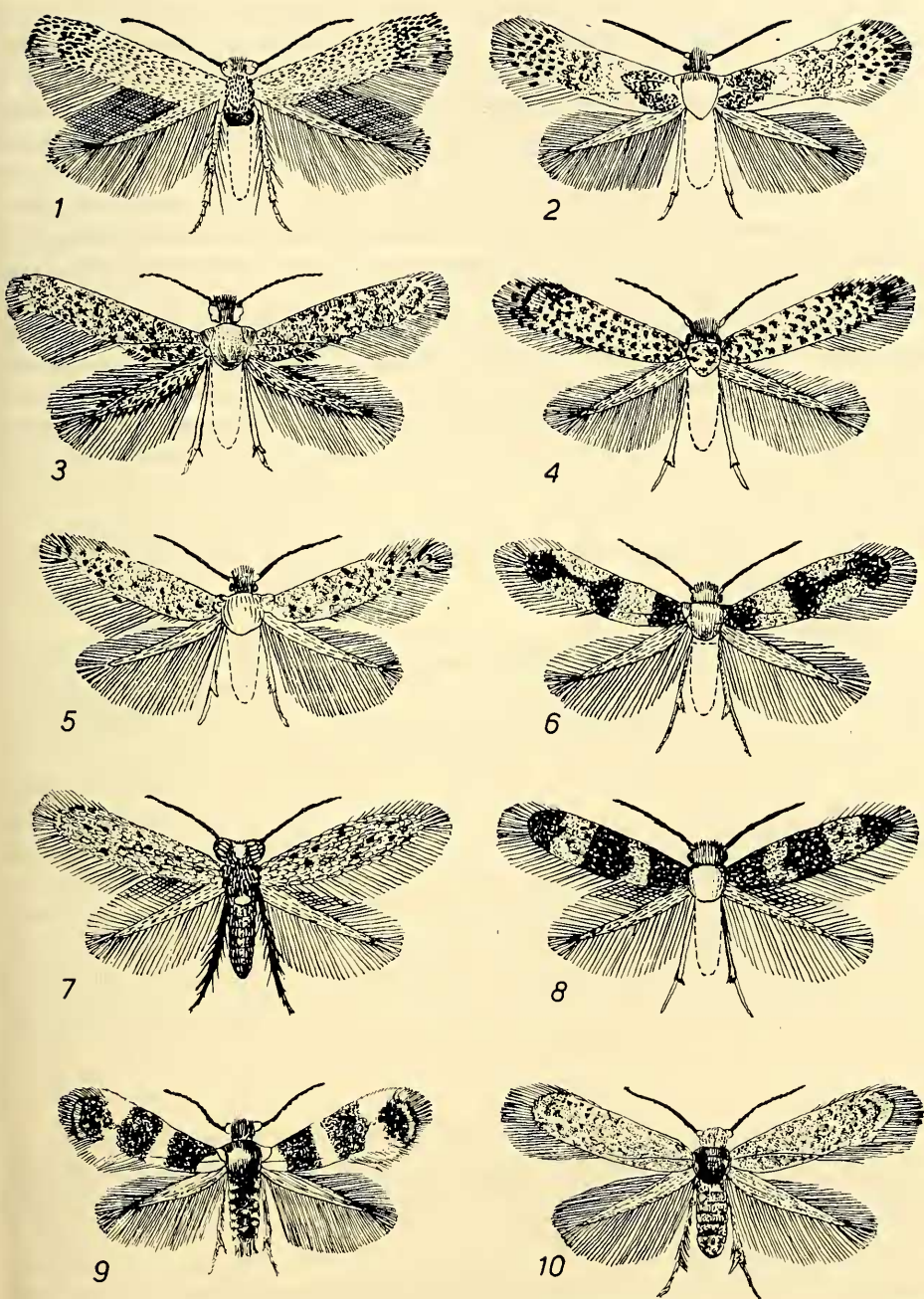
### **Taxonomic History**

The genus was described from a single specimen collected by Braun in Utah (loc. cit.). Since that description there are no other published records of the genus until now, even though some new species are described here from Braun's material.

Braun's description of the venation of this genus is somewhat incomplete owing to the fact that she was reluctant to damage the single specimen available to her. However, Dr. D. Davis of the USNM and I have examined the specimen which confirms Braun's description in part but also shows that a vestige of the Cubitus is, in fact, present on the forewing. This is also confirmed by our work on other species. Braun was also unable to provide a description of the hindwing venation; this information is also provided in this revision.

### **Generic description**

External features: ♂ ♀. Head: palps extending well beyond labrum, pale grey or white; antennae extending half the length of the forewing, fuscous; tuft on front of head usually ochreous, sometimes white or brown, vertex concolorous in most cases; eye-caps and collar ochreous, sometimes white or brown. Thorax pale white or buff and sometimes irrorate with brown. Abdomen usually concolorous with thorax, shining silver beneath. Venation as in fig. 11. Forewings: media coalescing with Radius at base and anastomosing as far as the middle of the wing; Cubitus vestigial;  $R_4$  coincident with  $R_5$ ; Anal vein not reaching the margin. Hindwings: Media single branched. Forewings: narrow and lanceolate, ground colour of dorsal surface grey or buff often with each scale brownish at the tip; fringe greyish, variously irrorate with wing scales apically; markings variable, usually with a single fascia or two patches. Hindwings: narrow and lanceolate, half width of forewings; usually grey and iridescent, sometimes with brightly coloured specialised scales on both surfaces concolorous, with similar patches on ventral surface of forewings. Legs: grey or brown, sometimes with scattered paler areas; proximal pair of spurs on hind-tibiae below the middle.



Figs. 1—10. External features. Fig. 1. *Microcalyptris scirpi*, male. Fig. 2. *M. thoracealbella*, male. Fig. 3. *M. postalatratius*, male. Fig. 4. *M. punctulata*, female. Fig. 5. *M. distaleus*, male. Fig. 6. *M. bipinnatellus*, female. Fig. 7. *M. bicornutus*, male. Fig. 8. *M. tenuijuxtus*, male. Fig. 9. *Fomoria pteliaeella*, male. Fig. 10. *F. hypericella*, male.

Male genitalia: vinculum always ring-shaped; tegumen fused with vinculum dorsally and produced into narrow, tapering pseuduncus sometimes weakly bilobed or bluntly rounded. Pseuduncus membranous and uncus sclerotized in the form of a bridge usually with medial process spatulate, sometimes narrowly pointed or papillate. Gnathos with complex anterior and posterior projections and unique sclerotised lateral arms of vinculum in all species except possibly *distaleus* sp.n. Saccus usually markedly bilobed. Valves slender, usually bluntly rounded. Transtillae forming an inverted U-shape; transverse bars continuous. Juxta often complex and heavily sclerotised. Aedeagus usually long and slender with large spine-like cornuti and anellus.

Female genitalia: Posterior apophyses at least as long as the ductus, sometimes terminally sagittate. Colliculum usually funicular and weakly sclerotised. Ductus spiculate, usually with complex sclerotisations in the form of fin-like plates. Bursa copulatrix: large and irregularly pectinate; signum double, usually comprising linear rows of spinose cells or plates and, in a single case, ovate patches of reticulate cells.

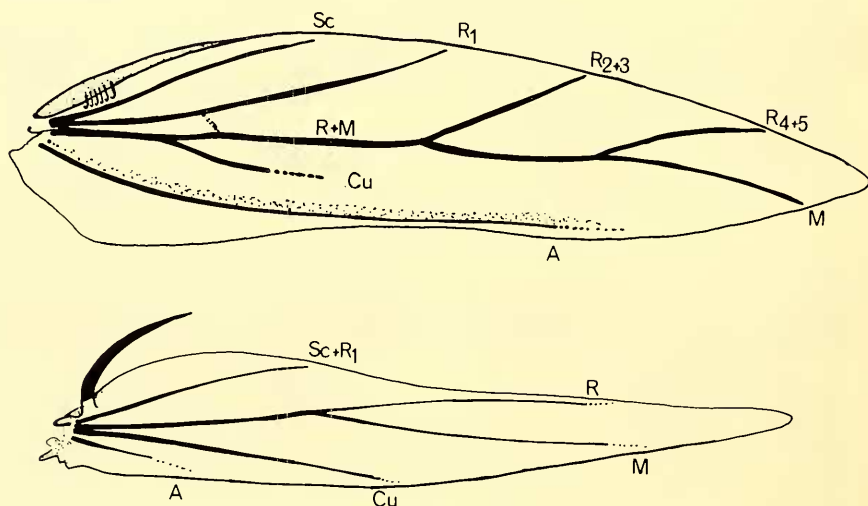


Fig. 11 *Microcalyptris* sp. Wing venation.

### Generic differential diagnoses

Characters which differentiate North American genera of the family Nep-ticulidae are given.

#### *Microcalyptris* Braun, 1925.

Venation: reduced; Media of forewing coalescing with Radius from base and anastomosing to a point beyond the middle of the wing;  $R_4$  coincident with  $R_5$ ; Cubitus vestigial; Media of hindwing single, unbranched. Ground colour of dorsal surface of forewing usually pale and variously irrorate. Proximal pair of spurs on hind tibia below middle. Male genitalia, with membranous pseuduncus and



strongly sclerotised bridge-like uncus; sclerotised gnathos with complex anterior and posterior projections; lateral arms of vinculum usually with associated sclerotisations. Female genitalia with complex sclerotisations of the ductus; posterior apophyses very long, longer than the ductus; signa usually comprising linear row of spinose cells or plates. Larvae mining leaves.

*Stigmella* Schrank, 1802.

Venation: Media of forewing coalescing with Radius at base and anastomosing to a point beyond the middle of the wing;  $R_4$  coincident with  $R_5$ ; Cubitus arising separately, approaching middle of the wing; Media of hindwing single. Forewings usually uniform and dark in colour, with one or two complete fasciae or patches; fringe with diffuse margin. Proximal pair of spurs on hind-tibiae above the middle. Male genitalia usually with U-shaped vinculum; tegumen strap-like, articulating with vinculum dorsally; uncus bilobed; juxta, if present, membranous; aedeagus usually flask-shaped, vesica usually with many denticulate cornuti orientated in a ridge and rarely with platelike cornuti at the anellus. Female genitalia with simple ductus and accessory sac; bursa copulatrix usually without signum, but if present often single and weakly sclerotised. Larvae mining leaves of trees and shrubs and sometimes herbs.

*Ectoedemia* Busck, 1907.

Venation: Media of forewing coalescing with Cubitus at base, passing obliquely to Radius at or beyond  $R_{2+3}$  and anastomosing to a point beyond middle of wing;  $R_4$  and  $R_5$  separate; Cubitus usually approaching margin; media of hindwing single. Proximal pair of spurs on hind-tibiae sometimes in the middle. Male genitalia with gnathos W- or V-shaped, may vary according to method of mounting; vinculum ring-shaped and without associated lateral bars; tegumen extended into tapering or lobed pseuduncus; uncus absent or weakly membranous; valves inwardly curved distally sometimes with digitate setae; juxta absent; aedeagus regular in shape with elaborate cornuti and usually anellar spines. Female genitalia with or without complex sclerotisation of the ductus and spiculate accessory lobe; apophyses shorter than ductus; signa comprising patches of reticulate cells. Larvae may mine in, or form galls on leaves, petioles, bark or cortex.

*Fomoria* Beirne, 1945.

Venation: Media coalescing with Cubitus from base, both passing obliquely to Radius at  $R_{2+3}$  and anastomosing to beyond middle of wing; Cubitus becoming obsolete;  $R_4$  and  $R_5$  separate; Media of hindwing single, unbranched. Male genitalia with membranous pseuduncus and uncus as a spatulate sclerotisation; Y- or V-shaped gnathos; saccus weakly bilobed; valves sometimes with dorsal spine; aedeagus regular in shape and usually with complex anellar spines and cornuti. Female genitalia, colliculum with sclerotised funicular antrum or complex plates; simple ductus; signa comprising rather linear patches of reticulate cells. Larvae often recorded pupating within the leaf-mine.

*Obrussa* Braun, 1915.

Venation: Media of forewing coalescing with Cubitus at base, both passing obliquely to Radius at  $R_{2+3}$  and anastomosing to beyond middle of wing; Media and Cubitus separate terminally;  $R_4$  and  $R_5$  separate; Media of hindwing single. Ventral surface of forewing and dorsal surface of hindwing in males with patch of brightly coloured specialised scales. Proximal pair of tibial spurs below middle of hind-tibia. Male genitalia with ring-shaped vinculum; tegumen extended into tapering pseuduncus; convex saccus; valves blunted distally and each with large dorsal arm projecting transversely to reach opposite side of capsule; vesica with transverse plate expanded laterally. Female genitalia with plate-like sclerotisation at the colliculum; signa comprising ovate reticulate patches. Larvae only known to mine fruits of *Acer* spp.

*Glaucolepis* Braun, 1917.

Venation: Media of forewing coalescing with Cubitus at base, both passing obliquely to Radius at  $R_{2+3}$  and anastomosing to beyond middle of wing; Media and Cubitus separate terminally;  $R_4$  and  $R_5$  separate; Media of hindwing bifurcate. Hindwing of male with patch of brightly coloured specialised scales. Proximal pair of spurs on hind-tibiae in the middle. Male genitalia with tegumen extended into tapering pseuduncus; gnathos with large transverse arms and medial dorso-lateral arms fusing terminally; valves markedly bifurcate distally; aedeagus with lateral cornuti extending full length of vesica and digitate distally. Female genitalia with simple ductus; signa comprising linear patches of rows of pectinations. Larvae mining leaves.

*Oligoneura* Davis, 1978.<sup>1)</sup>

Venation: greatly reduced; only two branches of Radius present; Media unbranched and arising from stem of  $R_{4+5}$ ; Cubitus absent; hindwing extremely slender and Media unbranched. Forewing dark fuscous with a single, narrow, pale golden yellow fascia at distal third. Proximal pair of spurs on hind tibiae near apex. Male genitalia with uncus vestigial; gnathos well developed, complex, consisting of two, largely separate, transverse sclerites of a highly irregular, but symmetrical outline; vinculum broad, quadrate; aedeagus moderately short and stout, with a relatively complex apex and no cornuti. Female unknown. Presumably a leaf mining genus. The type-species mines *Coccoloba uvifera* (L.).

*Artaversala* Davis, 1978.

Venation: greatly reduced; Radius unbranched, terminating well short of apex; Media unbranched, extending almost to apex; Cubitus shortened, indistinctly present; hindwing extremely slender and Media unbranched. Forewings with a pale yellow to whitish apex and a single, broad, median fascia. Proximal pair of spurs on hind-tibiae near apex. Male genitalia with tegumen reduced to an

<sup>1)</sup> The name *Oligoneura* is preoccupied by a Dipteran genus and must therefore be changed. In discussion with Dr. Davis it was decided to publish a replacement name in a subsequent volume of the Florida Entomologist.

extremely slender dorsal ring; uncus absent; vinculum well-developed and V-shaped; valves deeply divided and aedeagus relatively simple, without cornuti. Female genitalia with slender and elongate ductus; bursa copulatrix membranous; signa absent. Larvae mining leaves.

### Checklist to the species of *Microcalyptris*

*Microcalyptris* Braun, 1925b.

*scirpi* Braun, 1925. Type species by monotypy.

*thoracealbella* (Chambers, 1873),

= *badiocapitella* (Chambers, 1876).

specimen 11.

*punctulata* (Braun, 1910).

specimen 12.

*bipinnatellus* sp.n.

*postalatratus* sp.n.

*distaleus* sp.n.

*bicornutus* Davis, 1978.

*tenuijuxtus* Davis, 1978.

### *Microcalyptris*. Key to species. Males and females

1. Forewing with background predominantly dark; may have pale fascia or patches . . . . . 2
- Forewing with background predominantly light, may have dark fascia or irrorations . . . . . 5
2. Forewing dark without fascia or patches . . . . . 3
- Forewing dark with pale fascia or patches . . . . . 4
3. Male genitalia with H-shaped juxta, deeply bifurcate saccus and flattened pseuduncus . . . . . *bicornutus* (p. 81)
- Male genitalia without H-shaped juxta, saccus only weakly bifurcate, pseuduncus convex terminally as in fig. 19 . . . . . *postalatratus* (p. 77)
4. Forewing usually with 1 complete pale fascia and 1 broken in centre leaving 2 light patches. Pseuduncus of male bifurcate and uncus not extending beyond it, juxta mace-shaped with cornuti; 4th abdominal sternite with two patches of long setae; as in fig. 13c. Female genitalia with one long pair and one short pair of apophyses; signa less than 3 cells wide as in fig. 14 . . . . . *thoracealbella* (p. 67)
- Forewing usually with 2 large pale fasciae and terminal spot. Pseuduncus of male convex and uncus extending beyond it, juxta not strongly developed; 4th abdominal sternite without patches of long setae; as in fig. 17. Female genitalia with two pairs of very long apophyses; signa more than 3 cells wide; as in fig. 18 . . . . . *bipinnatellus* (p. 75)
5. Forewing pale with one broad dark brown terminal fascia. Male genitalia probably as in fig. 12, but see description . . . . . *scirpi* (p. 66)
- Forewing pale without dark fasciae but may be irrorate . . . . . 6

6. Male genitalia with well developed T-shaped (inverted) juxta; gnathos without central posterior process. Female genitalia without signa *tenuijuxtus* (p. 82)
- Male genitalia without well developed juxta; gnathos with central posterior process. Female genitalia with signa . . . . . 7
7. Male genitalia with pointed valves; bifurcate pseuduncus; aedeagus without very large annellar spines; as in fig. 20. Female genitalia with simple row of cells in signa and unmodified ductus bursae as in fig. 21 . . . . . *distaleus* (p. 78)
- Male genitalia with rounded valves; simple convex pseuduncus; aedeagus with very large annellar spines; as in fig. 16. See specimen 12. Female genitalia with complex signa and ductus bursae as in fig. 15 . . . . . *punctulata* (p. 71)

**Microcalyptris scirpi Braun**  
(figs. 1, 12)

*Microcalyptris scirpi* Braun, 1925b: 225 (Type species).

*Microcalyptris scirpi* Braun; McDunnough, 1939: 107 (no. 9790).

**Description.** External features: ♂ (fig. 1). Head: palps and antennae brownish buff; tuft on front of head and vertex light brown; eye-caps and collar brown. Thorax and abdomen shiny brown, probably light on living specimens. Forewings: ground colour of dorsal surface buff with gold reflections; terminally dark brown fascia extends onto fringe; fringe mainly buff, some dark brown at ends of fascia; ventral surface also buff but edged in dark brown all round and fringe greyish buff and in part dark brown. Hindwings: both surfaces and fringe greyish. Legs greyish buff with metallic reflections.

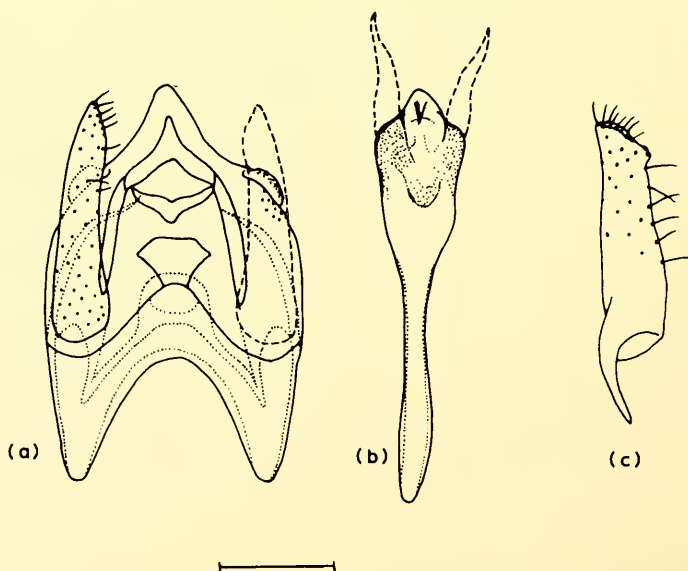


Fig. 12. *Microcalyptris scirpi*. Reconstructed male genitalia. a, genital capsule; b, aedeagus; c, valve.



Female not known.

Wing expanse<sup>1)</sup>: Holotype 5 mm.

Genitalia: ♂ (fig. 12). Unfortunately this species is known only from a single specimen and the abdomen has been damaged. Thus the genitalia are badly broken and infused with some substance which does not dissolve in the usual solvents. The figure and description are therefore reconstructions. Pseuduncus: prolonged backwards, single and uncus in form of inverted Y. Gnathos: probably Y-shaped. A pair of slender lateral support rods present, extending from base of uncus to base of valves. Vinculum: lateral arms narrow, almost equal to length of valves. Saccus broad, deeply bifurcate. Valves not reaching beyond pseuduncus, tapered terminally. Transtillae: lateral arms narrow. Juxta appears to be a simple weakly sclerotised lobe but may have two posteriorly directed spines. Aedeagus probably as illustrated although specimen is in three pieces. There is, on the slide, a broken "horn" which is possibly one of a pair belonging to the aedeagus (dotted). However, this is not certain and they could be part of the juxta.

Female not known.

Host plant: *Scirpus paludosus*.

Mine: A lower surface ophiome.

Diagnosis. The buff colour of the forewings together with the single brown terminal fascia should be sufficient to diagnose this species from others known at present — see check list page 65. The posterior Y-shaped sclerotisation of the gnathos is also characteristic as may be other parts when the structure is known for certain.

Discussion. Braun (1925b) described this genus and species from a single specimen. The specimen is still the only one representing *scirpi* although it should not be too difficult to acquire fresh material. We have no knowledge of the female and since the one male specimen has damaged genitalia we also need to be better informed regarding the structure of the male.

Distribution. USA: Utah.

Material examined. ♂ Holotype: USA: "B1142; Bear R. Bay, Utah, i.22.vi.24. Type collection of Annette F. Braun; *Microcalyptris scirpi* Braun Type"; slide no: USNM 16785; in ANS.

Biology. Mine. Uniformly narrow tract, 8 cm, blackish. Not visible from upper surface.

Cocoon. Brownish ochreous, ovoid, very convex above, lacking projecting rim, presumably found in other Nepticulidae.

### ***Microcalyptris thoracealbella* (Chambers)**

(figs. 2, 13, 14)

*Nepticula thoracealbella* Chambers, 1873: 127.

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<sup>1)</sup> The wing measurements represent the alar expanse in millimeters. The moths were measured from the middle of the mesothorax to the wing-tip and this figure was doubled to give the full alar expanse.

*Nepticula thoracealbella* Chambers; Chambers, in Hayden, 1878: 158.

*Nepticula thoracealbella* Chambers; Dyar, 1903: 547.

*Nepticula thoracealbella* Chambers; Braun, 1917: 189.

*Nepticula thoracealbella* Chambers; Braun in Forbes, 1923: 93.

*Nepticula thoracealbella* Chambers; McDunnough, 1939: 107 (no. 9763).

*Microcalyptis thoracealbella* (Chambers); Davis, 1978: 214.

*Nepticula badiocapitella* Chambers, 1876: 160 (syn. by Braun, 1917b: 189).

*Nepticula badiocapitella* Chambers; Chambers in Hayden, 1878: 157.

*Nepticula badiocapitella* Chambers; Dyar, 1903: 545.

**Description.** External features: ♂ (fig. 2). Head: palps creamy white; antennae pale greyish brown; tuft on front of head dark ochreous, vertex darker; eye-caps shining white; collar dark ochreous. Thorax whitish, weakly lustrous. Abdomen pale yellowish brown with metallic grey reflections on both surfaces. Forewings: ground colour of dorsal surface pale brown with bronze reflections, each scale

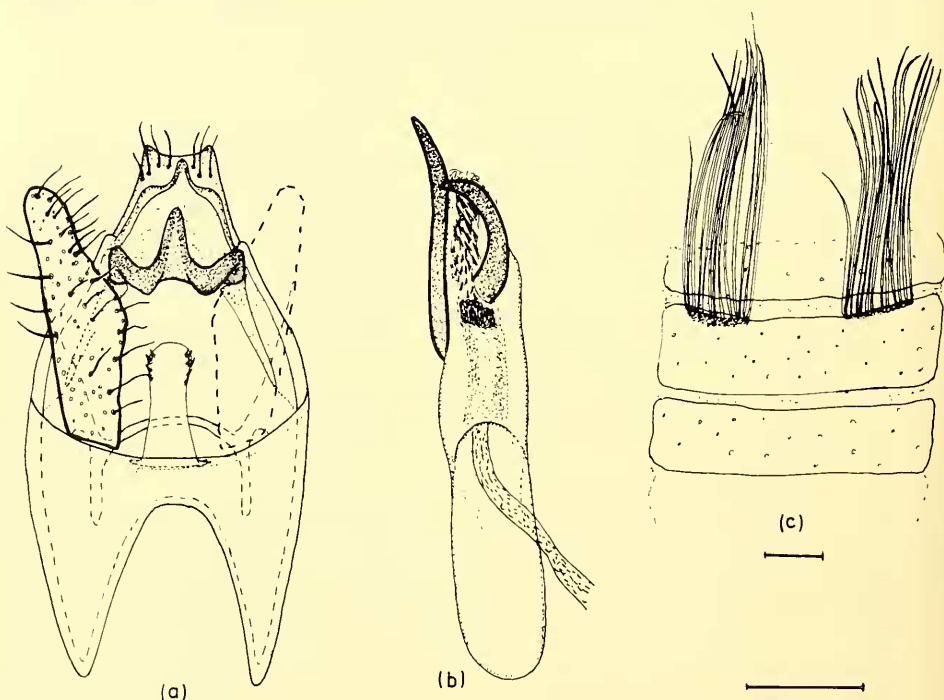


Fig. 13. *Microcalyptis thoracealbella*. Male genitalia. a, genital capsule; b, aedeagus; c, hair brushes on abdomen segment 4.

greyish at the base producing an irrorate effect which becomes more prominent distally; fringe variously irrorate with wing scales apically, whitish and iridescent silver; single medial fascia, off white, broadening on dorsal margin, followed by two marginal patches of the same colour, postmedial in position. Hindwings: ground colour and fringe pale greyish white, shining silver. Legs pale yellow-brown with scattered metallic grey reflections. A pair of hair brushes dorsally on segment IV, lateral in position as in fig. 13c.

Female. As ♂ except for a pair of convex external pockets ventrally on the third abdominal segment, medial in position. Hair brushes absent.

Wing expanse: ♂: 4.6–5.2 mm (4 specimens); ♀: 4.6–4.8 mm (2 specimens). Holotype: 4.8 mm.

Genitalia: ♂ (fig. 13). Pseuduncus extended, weakly bilobed posteriorly; uncus a bridge-like sclerotisation with a single medial process. Gnathos: as in fig. 13a; transverse ventral plate with a broad medial process; dorso-lateral arms broad and blunted terminally. Vinculum: lateral arms narrow with associated weakly sclerotised bars; ventral plate very narrow. Saccus broader than the ventral plate, markedly bilobed with each lobe twice as long as broad at the base. Valves not reaching beyond the pseuduncus, straight and blunted terminally. Transtillae: lateral arms short and narrow; ventral arms long and straight; transverse bars

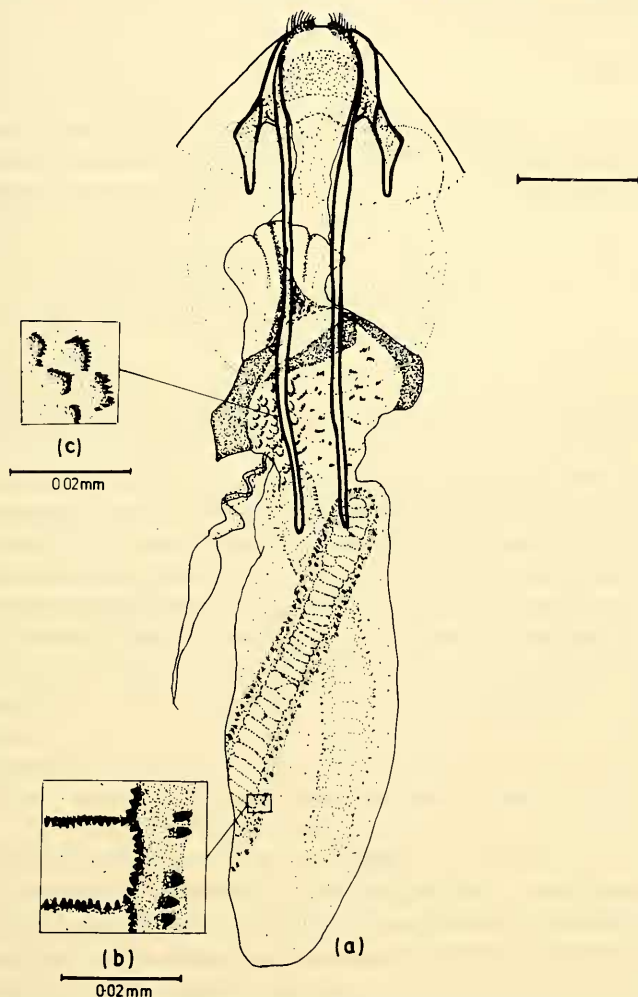


Fig. 14. *Microcalyptris thoracealbella*. Female genitalia. a, genitalia; b, detail of signum enlarged; c, detail of ductus bursa enlarged.

fused to form a continuous narrow strap. Juxta a flask-shaped spinose plate as in fig. 13a. Aedeagus: regular, equal to length of the capsule, with a medial orifice at the point of entry of the ductus ejaculatorius; vesica well defined, with cornuti as small denticles distally and with a cup-shaped plate of minute papillae; anellus comprising a pair of very large canine tooth-like spines.

Female (fig. 14). Colliculum funicular and weakly sclerotised. Ductus bursae short, expanding medially and bearing three fin-like plates as in fig. 14a. Accessory duct arising from area of dilation, spiral proximally. Bursa copulatrix: covered proximally with scallop-shaped chains of pectinations as in fig. 14c; signum double, comprising two equal length bands of spinose cells with a spinose margin as in figs. 14a and b. Anterior apophyses short and broad. Posterior apophyses narrow, approximately four times length of anteriores. Anal plate large and constricted medially as in fig. 14a.

Host plant: Not known.

Mine: Not known.

Diagnosis. Resembles *bipinnatellus* sp.n. in the pattern of wing markings, but the darker ground colour, smaller distal patches and the absence of the apical patch in *thoracealbella* separates the two. The male genitalia also resemble those of *bipinnatellus* sp.n. but are separated by the papillate pseuduncus, the single lobe of the juxta, and the shorter aedeagus relative to the capsule, in *thoracealbella*. The female genitalia most closely resemble those of *punctulata*: the scallop-shaped pectinations on the ductus and the form of the cells of the signa in *thoracealbella* distinguish the two.

Discussion. Originally described by Chambers (1873) from a single specimen captured in Kentucky. Chambers later (1876) described a similar species also from a single Kentucky specimen, under the name *badiocapitella*. Braun (1917) regarded these two as synonymous, stating that the descriptions were virtually identical and that the range of variation found in *thoracealbella* is sufficient to include *badiocapitella*. The material examined in this study, which is believed to represent *badiocapitella*, has been checked with the type of *thoracealbella*, and found to be similar. However there is no trace of the type of *badiocapitella* and this prevents a complete comparison. Chambers' description of *badiocapitella* could also be applied to *bipinnatellus* sp.n. especially in the form of the forewing markings, but in the interests of nomenclatorial stability *badiocapitella* is left in synonymy with *thoracealbella*.

There is a single ♀ from Arkansas, labelled specimen 10, which differs only in that the tuft on the vertex and the forewing ground colour are dark chocolate brown.

Distribution. USA: Kentucky, Pennsylvania, Ohio, Virginia, New York.

Material examined. ♂ Holotype: USA: "Kentucky Chambers; *thoracealbella*; Type 14952; labelled as *N. thoracealbella*, MCZ"; CNC slide no. 3513; in MCZ.

Other specimens: In USNM: Pennsylvania, Arendtsville; 1 ♀, 2.vii.1921, 2 ♂, 3 ex., 6.vii.1921 (Frost). Pennsylvania, Harrisburg; 1 ♂, 24.vi.1912. Virginia, Mountain Lake; 1 ♂, 23.vii.1940 (Milne and Milne). In ANS: Ohio, Cincinnati; 1 ♂, 17.vii.1903, 1 ♀, 1945, 1 ♀, 20.v.1945 (Braun). In L. A. Co. Museum: New York



Sea Cliff; 1♂ 20.v.? Specimen 10: In USNM: Arkansas, Devil's Den St. Pk., Washington County; 1♂, 1♀, 23.vi.1966 (Hodges); slide no. USNM 17298; wing expanse 5.2 mm.

Biology. Immature stages unknown.

Voltinism. Bivoltine with adults on the wing in May and in late June and July.

### Specimen 11

There is a single male with externals like *thoracealbella* except that the tufts on the head are darker, the thorax and forewings are pale brown and the distal markings of the forewing are triangular streaks rather than patches. The genitalia are badly damaged but can be seen to differ from *thoracealbella* in the following: the juxta is valve-like in form with a weakly curved apical hook; the spines of the anellus are shorter than in *thoracealbella* and the cornuti comprise a transverse papillate plate which is expanded laterally as in *Obrussa* spp.

This specimen is labelled as reared from *Scirpus olneyi*. Specimen 11: In USNM: Maryland, Blackwater Refuge; from *Scirpus olneyi*; 1♂, 11.viii. 1943; slide no. USNM 16273; wing expanse 4.0 mm.

### *Microcalyptris punctulata* (Braun) comb. n.

(figs. 4, 15)

*Nepticula punctulata* Braun, 1910: 174.

*Nepticula punctulata* Braun; Braun, 1917: 192.

*Nepticula punctulata* Braun; McDunnough, 1939: 107 (no. 9769).

Description. External features: ♂ ♀ (fig. 4). Head: palps whitish buff; antennae pale brown; tufts on front of head very pale buff, vertex usually brownish; eye-caps buff; collar buff. Thorax pale greyish buff, sometimes irrorate with brown. Abdomen brown, shining metallic grey beneath. Forewings: ground colour of dorsal surface greyish buff with scattered silver reflections, variously irrorate with scales brownish at the tip; fringe grey, shining silver. Hindwings: ground colour and fringe pale greyish buff. Legs grey-buff with scattered paler areas, shining, metallic grey behind.

Wing expanse: ♂: 5.0 mm (1 specimen); ♀: 4.8–6.0 mm (2 specimens). Lectotype: 4.8 mm.

Genitalia: ♂: not known (the abdomen is missing from the 1♂ specimen but see specimen 12). ♀ (fig. 15): Colliculum membranous. Ductus bursae long, covered with small denticles proximally and more elongate spicules distally, and with a medial expansion bearing three fin-like sclerotisations as in fig. 15a. Accessory duct arising from area of dilation, spiral distally. Bursa copulatrix: covered proximally with irregular chains of pectinations; signum double, comprising two equal linear bands of spinose plates as in figs. 15a and b. Anterior apophyses broad basally, with associated papillae as in figure. Posterior apophyses as long as ductus and straight.

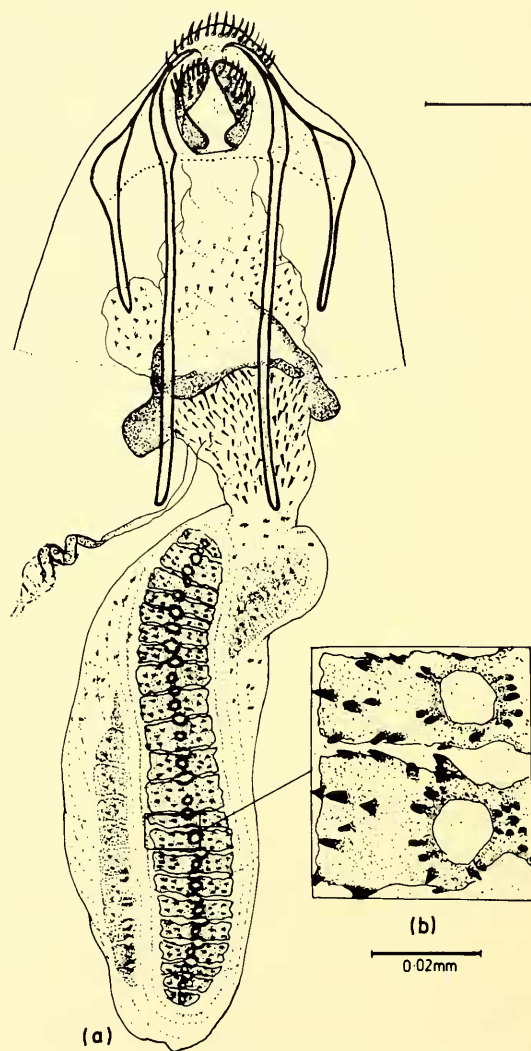


Fig. 15. *Microcalyptris punctulata*. Female genitalia. a, genitalia; b, enlarged detail of signum.

Host plant: *Ceanothus cuneatus* and *Rhamnus californica*.

Mine: an upper surface ophionome.

Diagnosis. Resembles *distaleus* sp.n. in externals but differs in the generally darker ground colour in *punctulata*; the absence of fasciae or patches on the forewing separates *punctulata* from *thoracealbella* and *bipinnatellus* sp.n. The female genitalia most closely resemble those of *thoracealbella*; the spicules of the ductus and the spinose plates of the signa in *punctulata* separate the two.

Discussion. A better evaluation of the affinities may be made when male genitalia are known. The female genitalia relate closely to *thoracealbella*, compare figs. 14 and 15. This species was originally described from two specimens bred

from *Ceanothus cuneatus* in California. They were labelled as cotypes by Braun. Both have been examined and are in extremely poor condition. They are unsuitable for reference to the externals, however, the specimen designated as lectotype is the one from which a genitalia slide has been prepared.

Distribution. USA: California.

Material examined. I designate as lectotype, a ♀ syntype; USA: "B.422; Dutch Flat, Placer Co., Cal. i. 22.ii.1909; Type Collection of Annette F. Braun; *Nepticula punctulata* Braun Cotype"; on *Ceanothus cuneatus*; slide No. USNM 16212; in ANS.

Paralectotype: In ANS: same data as lectotype, 1 ex.

Other specimens: In ANS: California, Loma Linda; 1 ♀, 3.vi.1912, 1 ♀, 8.iv., 1 ex., 18.vi.1912, 1 ♂, 25.vi.1912, (Pilate).

Mines examined: In ANS: California, Dutch Flat, Placer Co.; 2 mines on *Ceanothus cuneatus*; 6.i.1909, B.422 (Braun).

Biology. Egg. Laid on the lower surface of the leaf.

Host. Braun (1917) reports that the species also mines leaves of *Rhamnus californica* from Yosemite, although this material has not been traced.

Mine. A short linear mine not visible from the upper surface in the earlier stages later becomes quite distinct and usually follows the margin of the leaf. The frass is deposited as a central black line.

Larva. Emerges on the upper surface of the leaf.

Cocoon. Reddish brown in colour.

Voltinism. Trivoltine with adults on the wing in February, April and June. Braun (loc.cit.) records that the mines on *Rhamnus* were collected in July.

### Specimen 12 (fig. 16)

There is a single male which may be conspecific with *punctulata*:

Description. External features: ♂. As *punctulata* except that: tufts on front of head and vertex creamy white; forewings dorsally lustrous white, each scale darker at the tip producing a slight irrorate effect; forewings ventrally covered with creamy white scales almost to the tip; hindwing dorsal and ventral surfaces covered with creamy white scales extending almost to the tip.

Genitalia: ♂ (fig. 16). Pseuduncus long, with a single blunted lobe and uncus with bridge-like sclerotisation and a broad, spatulate medial process. Gnathos: transverse ventral plate with a long thin medial process; dorso-lateral arms broad and blunted with short posteriorly-directed processes. Vinculum: lateral arms with associated weakly sclerotised bars tapering distally; ventral plate reduced. Saccus broad, markedly bilobed, each lobe as long as broad at the base. Valves not reaching the pseuduncus, broad and constricted medially, rounded terminally. Transtillae: lateral arms short and broad; ventral arms long and tapering; transverse bars indeterminate. Juxta with a broad boat-shaped base as in fig. 16a, distal portion indeterminate. Aedeagus: equal to length of capsule, broadening distally and with a medial orifice; vesica well defined with cornuti in form of several long denticles distally and a cup-shaped plate of minute papillae; anellus comprising a pair of very long tooth-like spines.

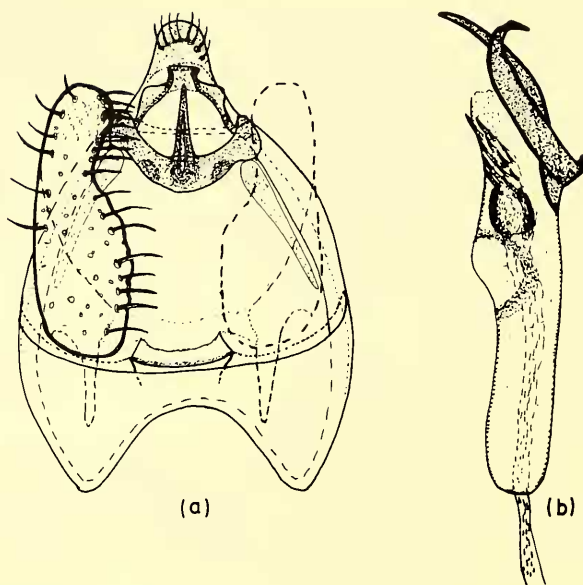


Fig. 16. *Microcalyptris* specimen 12. Male genitalia. a, genital capsule; b, aedeagus.

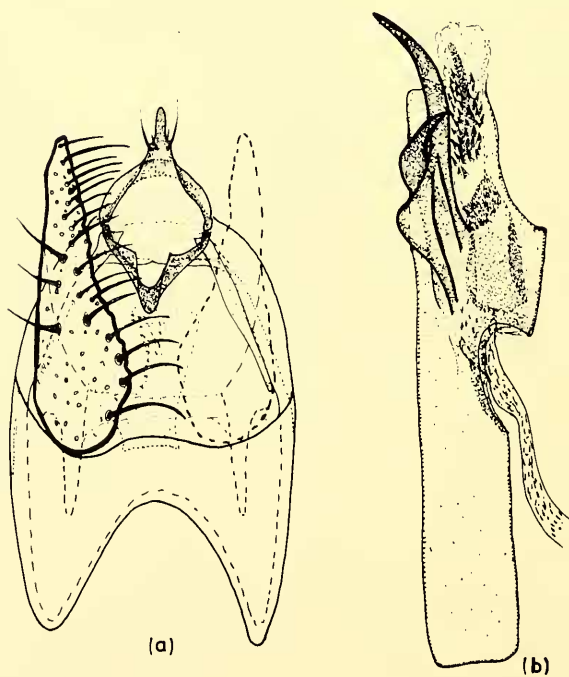


Fig. 17. *Microcalyptris bipinnatellus*. Male genitalia. a, genital capsule; b, aedeagus.



**Diagnosis.** Resembles *thoracealbella* in the overall form of the male genitalia but may be separated by the longer single lobe of the pseuduncus, the sharp medial process of the gnathos and the more weakly bilobed saccus, in specimen 12. The externals are generally more white than the females of *punctulata* and the absence of scattered brown scales on the forewings separates it from the males of *distaleus* sp.n.

**Discussion.** The similarity of this specimen to *punctulata* suggests that it may represent the male of that species. The genitalia are close to those of *thoracealbella*, a fact which correlates well with the relationship between the female genitalia of *punctulata* and *thoracealbella*.

**Material examined.** Specimen 12: USA: Arizona, Flagstaff; 1♂, 17.vii.1939 (Braun); wing expanse: 5.2 mm; slide no. 149—PJN; in ANS.

### ***Microcalyptris bipinnatellus* sp.n.**

(figs. 6, 17, 18)

**Description.** External features: ♂. Head: palps greyish; antennae dark grey-brown; tuft on front of head ochreous, vertex paler; eye-caps off-white, weakly lustrous; collar sandy buff. Thorax sandy buff, irrorate with very pale brown. Abdomen brown-grey with metallic reflections above, shining silver beneath. Forewings: ground colour of dorsal surface very pale brown, each scale darker at the tip, scattered blue reflections; fringe greyish white, becoming creamy white at the apex; two creamy white fasciae, antemedial variable in width but usually broadening on the dorsal margin, postmedial oblique and broken by a line of brown scales centrally, followed by a creamy white apical patch, variable in extent. Hindwings: ground colour and fringe greyish, shining silver. Legs dark brown with paler areas, shining metallic grey behind.

Female (fig. 6). As ♂ except for a pair of convex, external pockets ventrally on the third abdominal segment.

Wing expanse: ♂: 4.6—5.6 mm (2 specimens); ♀: 5.0—6.4 mm (6 specimens). Holotype: 6.8 mm.

**Genitalia:** ♂ (fig. 17). Pseuduncus single lobed; uncus with bridge-like sclerotisation and a large medial process. Gnathos: as in fig. 17a; transverse ventral plate with large medial process; dorso-lateral arms narrow and tapering. Vinculum: lateral arms with associated weakly sclerotised bars, ventral plate reduced, with a convex medial expansion. Saccus broad, markedly bilobed with each lobe longer than broad at base. Valves not reaching the pseuduncus, narrow and tapering distally. Transtillae: lateral arms short and broad; ventral arms long and straight; transverse bars indeterminate. Juxta trifurcate with central lobe spinose. Aedeagus: longer than the capsule, broadening distally, basally quadrate with large medial orifice at the point of entry of the ductus ejaculatorius; vesica well defined with cornuti as small denticles distally and with a cup-shaped plate of minute papillae; anellus comprising a pair of very large hook-like spines.

Female (fig. 18). Colliculum with weakly sclerotised funicular antrum and a pair of fin-like plates. Ductus bursae long and weakly sclerotised, with a pair of fin-like

plates distally. Accessory duct arising distally. Bursa copulatrix: with weakly sclerotised chains of pectinations proximally; signum double, comprising two ovate cellular patches of equal size, as in figs. 18a and b. Anterior apophyses long and narrow. Posterior apophyses broad and sometimes club-shaped distally, reaching well beyond the anteriores. Anal plate ovate as in fig. 18a.

Host plant: Not known.

Mine: Not known.

Diagnosis. Similar to *thoracealbella* in externals but the paler ground colour, the larger distal patches and the presence of the apical patch on the forewings of *bipinnatellus* separate the two. The male genitalia also resemble those of *thoracealbella* but they may be differentiated by the single lobe of the pseuduncus, the tapering valves and the longer aedeagus relative to the capsule, in *bipinnatellus*. The female genitalia are differentiated from other members of the genus, listed on

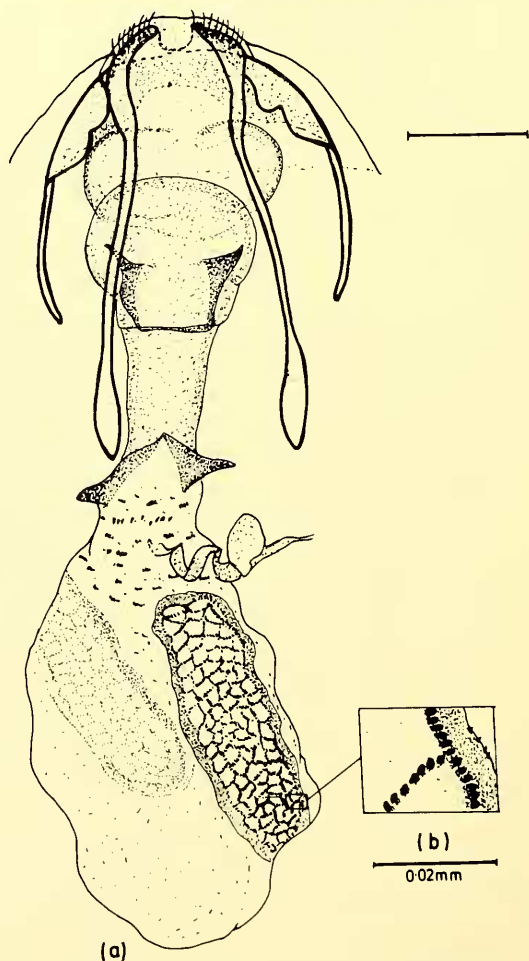


Fig. 18. *Microcalyptis bipinnatellus*. Female genitalia. a, genitalia; b, enlarged detail of signum.

page 65, by the complex ornamentation of the ductus and the ovate signa in *bipinnatellus*.

Discussion. Perhaps most closely related to *thoracealbella* judging from externals and male genitalia. This new species is represented by a well mounted and prepared type series collected by Hodges comparatively recently.

Distribution. USA: Florida.

Material examined. ♂ Holotype: "Florida Lake Placid Archbold Bio. Sta. 1—8 June 1964 R. W. Hodges"; slide no: USNM 17282; in ANS. Paratypes: In USNM: Florida, Lake Placid, Archbold Bio. Sta.; 1 ♀, 1—7.v.1964, 3 ♀, 8—15.v.1964 (Hodges). Florida, Fisheating Cr. Palmdale; 1 ♀, 7—10.v.1964 (Hodges). Florida, Parker Is., Highlands Co.; 1 ♂ 26—29.v.1964 (Hodges). Florida, Roy. Palm State Park; 1 ♂, 3 ♀, i.1930 (Jones, F. M.); slide nos: USNM 17240, 17241, 17253, 17281, 17302, 17303, 17427, 17428, 17247.

Biology. Immature stages unknown. Voltinism. Univoltine, with adults on the wing throughout May and in early June.

Etymology. Pinna (Latin): fin.

***Microcalyptris postalatratrus* sp. n.**

(figs. 3, 19)

Description. External features: ♂ (fig. 3). Head: palps greyish; antennae pale brown; tufts on front of head and vertex dark brown; eye-caps creamy white, lustrous; collar dark brown. Thorax and abdomen buff with scattered brown scales, abdomen shining metallic grey beneath. Forewings: ground colour of

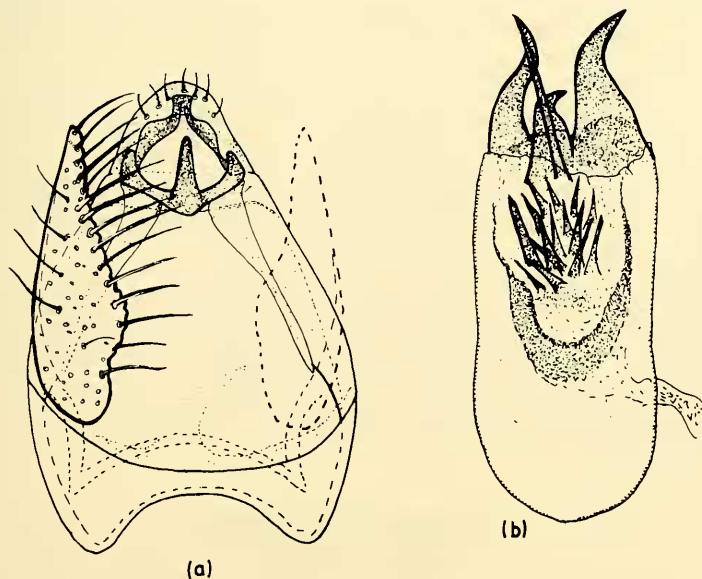


Fig. 19. *Microcalyptris postalatratrus*. Male genitalia. a, genital capsule; b, aedeagus.

dorsal surface buff, with each scale dark brown at the tip; fringe greyish with several purplish black scales at the base of the dorsal margin, otherwise shining metallic grey; ventral surface with an oval patch of purplish black scales extending to two thirds. Hindwings: dorsal and ventral surfaces covered with purplish black scales extending almost to the apex; fringe greyish, shining metallic grey. Legs pale greyish brown with metallic grey reflections behind.

Female. Not known.

Wing expanse: ♂: 3.4 mm (paratype); holotype: 5.4 mm.

Genitalia: ♂ (fig. 19). Pseuduncus with a single rounded lobe and uncus bridge-like with a spatulate central process. Gnathos: transverse ventral plate with a large medial process, tapering distally; dorso-lateral arms blunted with short posteriorly-directed processes. Vinculum: lateral arms with associated weakly sclerotised bars broad at the base; ventral plate reduced. Saccus narrow, bilobed with each lobe as long as broad at base. Valves not reaching the pseuduncus, narrow and tapering distally. Transtillae: broadly W-shaped as in fig. 19a, lateral arms long and narrow, ventral arms short; transverse bars fused to form a continuous arcuate strap. Juxta membranous. Aedeagus: broad and regular, equal to length of capsule; vesica well defined with cornutus in form of many large denticles distally and a cup-shaped plate of minute papillae; anellus comprising a pair and two single tooth-like spines. Female not known.

Host plant: Not known.

Mine: Not known.

Diagnosis. The striking contrast between the forewing ground colour and the purplish black scales of the hindwing separate this from all the other members of the genus discussed here. The genitalia resemble those of other members of the genus but may be differentiated by the short, rounded lobe of the pseuduncus, the short lobes of the saccus and the rather broad, squat appearance of the aedeagus.

Discussion. Externally this species appears not closely related to any other in the genus as it is presently understood but the male genitalia correspond well. Further collection and the rearing of females especially, may make its affinities within the genus more clear. Described from two specimens collected by Braun in Arizona, but she failed to name them and identify them as belonging to her genus *Microcalyptris*.

Distribution. USA: Arizona.

Material examined. ♂ Holotype: USA: "Chiricahua Mts., nr. Portal, Arizona. 4.vii.1939, A. F. Braun"; slide no: 150—PJN; in ANS. Paratype: In ANS: Arizona, Superior; 1 ♂, 11.vii.1939 (Braun); slide no: 151—PJN.

Biology. Immature stages unknown.

Etymology. *Atratus* (Latin): dressed in black.

### ***Microcalyptris distaleus* sp.n.**

(figs. 5, 20, 21)

Description. External features: ♂ ♀ (fig. 5). Head: palps whitish; antennae pale brown; tuft on front of head whitish ochre, vertex whitish; eye-caps white; collar



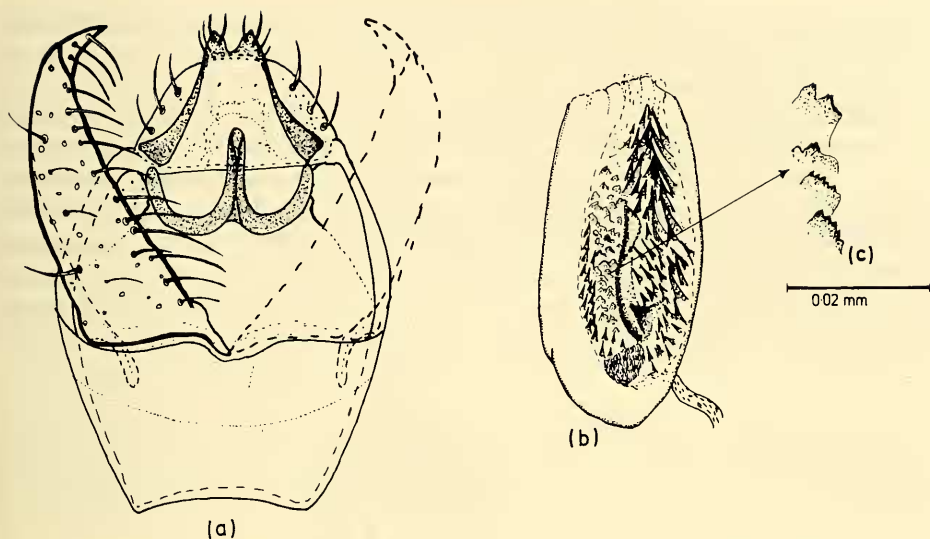


Fig. 20. *Microcalyptris distaleus*. Male genitalia. a, genital capsule; b, aedeagus; c, detail on vesica enlarged.

creamy white. Thorax and abdomen creamy white, abdomen with metallic reflections beneath. Forewings: ground colour of dorsal surface white, sparsely irrorate with scales brown at the tip, shining silver; fringe whitish, shining silver. Hindwings: ground colour and fringe pale greyish white with scattered darker areas.

Wing expanse: ♂: 5.2 mm (1 specimen); ♀: 4.2 mm (1 specimen). Holotype: 6.2 mm.

Genitalia: ♂ (fig. 20). Pseuduncus with broad single lobe, uncus bridge-like bifurcate and papillate extending beyond pseuduncus. Gnathos: as in fig. 20a, transverse ventral plate with large medial process; dorso-lateral arms long and narrow. Vinculum: apparently lacking associated sclerotised bars; ventral plate broad with medial excavation. Saccus as broad as ventral plate, very weakly bilobed. Valves: reaching just beyond the pseuduncus, tapering markedly and pointed terminally. Transtillae: with short, stout lateral arms; transverse bars indeterminate. Aedeagus: markedly shorter than the capsule, regular in width; vesica with cornuti as many small denticles orientated in a ridge laterally and with a large medial spine as in fig. 20b and also with a cup-shaped plate of minute papillae.

Female (fig. 21). Colliculum membranous. Ductus bursae long, expanding distally. Accessory duct arising distally with a single patch of spines at the vestibule, spiral distally. Bursa copulatrix: large and covered proximally with short chains of weakly sclerotised pectinations; signum double, comprising two equal bands of spinose cells with whorls of pectinations as in fig. 21a and b. Anterior

apophyses short and broad. Posterior apophyses long and straight, markedly longer than the anteriores.

Host plant: Not known.

Mine: Not known.

Diagnosis. Rather paler than the other members of the genus, listed on page 65, except for Specimen 12; the scattered brown scales of the forewing in *distaleus* separate the two. The male genitalia are easily differentiated by the markedly tapering valves, the papillate sclerotisation of the pseuduncus and the orientation of the cornuti. The female genitalia resemble those of *thoracealbella* and *punctulata* in the form of the signa, but the absence of any sclerotisation on the ductus and the spiculate accessory duct, in *distaleus*, are diagnostic.

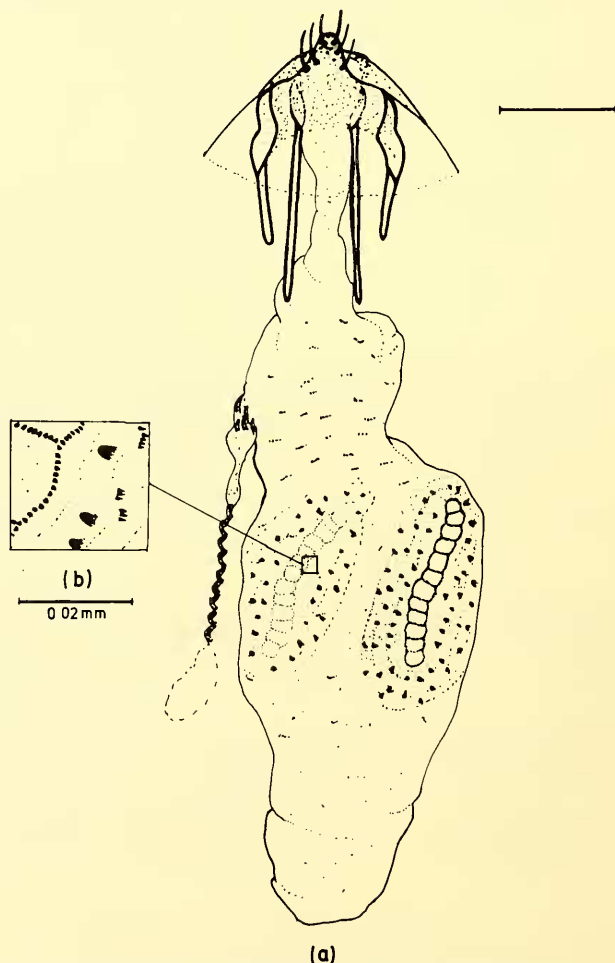


Fig. 21. *Microcalyptris distaleus*. Female genitalia. a, genitalia; b, detail of signum enlarged.

Discussion. This species is rather atypical of the genus, because the male lacks the characteristic lateral bars associated with the vinculum and gnathos, the

complex form of the anellus and differs in the overall nature of the aedeagus. The female is also atypical in the absence of an antrum and the associated sclerotisation of the ductus which is found in the other known members of the genus. Especially the wing venation and general aspects of both male and female genitalia do, however, indicate that it is congeneric with *thoracealbella*.

Distribution. USA: Arizona; California.

Material examined. ♂ Holotype: USA: "Flagstaff, Arizona, 18.vii.1939, A. F. Braun"; slide no: 153—PJN; in ANS. Paratypes: In ANS: Arizona, Flagstaff; 1 ♀, 18.vii.1939 (Braun). California, Loma Linda; 1 ♂, 14.vi.1912 (Pilate); slide nos: 152—PJN, 154—PJN.

Biology. Immature stages unknown.

Etymology. Talea (Latin): slender staff or rod; dis (Latin): without.

The two new species following are recently published by my colleague Dr. D. R. Davis in a paper entitled "New Leaf-mining Moths of the Family Nepticulidae from Florida." Thus there is no need to treat them in full, but a diagnosis and other important details are given for the sake of completeness.

### ***Microcalyptris bicornutus* Davis**

(fig. 7)

*Microcalyptris bicornutus* Davis, 1978: 212.

Diagnosis. ♂ ♀. (fig. 7). Fully described by Davis (loc. cit.). Head yellowish. Palps and forewings uniformly greyish brown, paler basally. Scales often tipped with fuscous. Hindwings uniform lighter grey. In females the sternites of the abdomen has a pair of indistinct fenestrae situated near anterior margin, on either side of the mid-ventral line.

Male genitalia (see Davis, loc.cit., figs. 18—20) with blunt, apically flattened pseuduncus. Uncus a bridge-like sclerotisation associated with pseuduncus and gnathos, similar to that of *postalatratrus*. Gnathos also similar. Vinculum with a pair of characteristic slender apophyses projecting anteriorly. Valves simple, rounded terminally. Juxta is large, complex and therefore diagnostic; comprising a broad plate, deeply bifurcate anteriorly and posteriorly, producing rounded apodemes directed forwards and pointed apodemes backwards. Aedeagus arcuate, without cornuti, but having typical large canine tooth-like spine on anellus.

Female genitalia (Davis, loc.cit., fig. 32) have the usual very long posterior apophyses. Bursa copulatrix membranous with a pair of asymmetrical signa; each signum mostly comprising a single row of 20—31 scalariform 'cell' elements with thickened margin.

Discussion. The species is described from a large series of 48 types. They were collected as adults so the host plant, mine and biology of the immature stages are unknown. *M. bicornutus* is apparently univoltine with a flight period between September and late November.

The long support rods extending from the gnathos in the male and the very long posterior apophyses in the female are of particular interest in *Microcalyptris* species.

Distribution. USA: Only known from Florida Keys.

Material examined. ♂ Holotype: USA: "Key Largo, Monroe Co., Florida; 19.xi.1964. Mrs. Spencer Kemp". ♂ genitalia USNM 16938 Holotype USNM 72105 in USNM. Paratypes. In USNM: 40♂, 7♀, data as holotype, 8.x.—20.xi.1964, 29.ix.1972.

### ***Microcalyptris tenuijuxtus* Davis**

(fig. 8)

*Microcalyptris tenuijuxtus* Davis, 1978: 216.

Diagnosis. ♂ ♀ (fig. 8). Described by Davis (loc.cit.); the following characters separate this species from the others described here. Almost entire moth pale yellowish white, forewing with some brown irrorations in basal two thirds and increasing distally including fringe almost forming two brown fasciae in some specimens (e.g., Holotype). Hindwing white to pale yellowish. Abdominal fenestrae absent.

Male genitalia (see Davis, loc.cit., figs. 21—23). Pseuduncus characteristic with a median lobe, a pair of spine-like lobes and a pair of rounded lobes arising from it; median lobe (probably uncus) with four small apical setae and the pair of rounded lobes, each with one seta. Gnathos horn-like and bearing the lateral support rods. Vinculum with anterior apophyses moderately well developed. Valves slender and rounded apically. Juxta in shape of inverted T with arms rounded and stem bifurcate at tip. Aedeagus characteristic with about three apical spines and rounded lobes apically.

Female genitalia (Davis, loc.cit., fig. 33). Posterior apophyses again very long. Bursa copulatrix without signa. Accessory duct present with spiral distally as in *bicornutus*.

Discussion. This species is described from 22 specimens, but only one is female. It is somewhat unusual in that the female has no signa on the bursa, and the male has the curious development on the pseuduncus. The host plant, mine and immature stages are unknown. The species is probably univoltine although the range of collecting dates (early October to late November) may simply reflect the periodicity of the collector.

Distribution. USA: Florida Keys.

Material examined. ♂ Holotype: USA: "Key Largo, Monroe Co., Florida, 17.xi.1964. Mrs. Spencer Kemp." ♂ genitalia USNM 1680, Holotype USNM 72106 in USNM. Paratypes. In USNM: 20 ♂, 1 ♀ same data as holotype, 8.x.—28.xi.1964.

### ***Fomoria* Beirne, 1945**

*Fomoria* Beirne, 1945: 208. Type species by original designation: *Fomoria weaveri* (Stainton).

#### **Taxonomic history**

The genus was originally described by Beirne (1945) as a European genus with

two species *weaveri* and *septembrella* (Stainton) transferred to it from "*Nepticula*" von Heyden, 1843 — a junior synonym of *Stigmella* Schrank, 1802 (see Wilkinson, 1978: 13).

The original generic description was based on the structure of the male genitalia. Comment was made on the colour of the head and wings and also on larval habits. However, venation and female structures were not discussed although venation, at least, is characteristic.

The two species which are here transferred to *Fomoria* are the first North American species to be recognized as belonging to this genus.

### Generic description

External features: ♂ ♀. Head: palps extending well beyond labrum, pale in colour; antennae approximately half the length of the forewing, pale or brown annulate with paler areas; tuft on front of head brown or ochreous, vertex concolorous; eye-caps white, sometimes with fuscous scales distally; collar as vertex. Thorax dark brown to black and iridescent. Abdomen brown and iridescent gold or silver. Venation: as in fig. 22. Forewings: Media coalescing with Cubitus at base and both passing obliquely to Radius at  $R_{2+3}$ ; Cubitus becoming obsolete;  $R_4$  and  $R_5$  separate. Hindwings: Media single-branched. Forewings: elongate and ovate in shape, ground colour of dorsal surface brown, sometimes

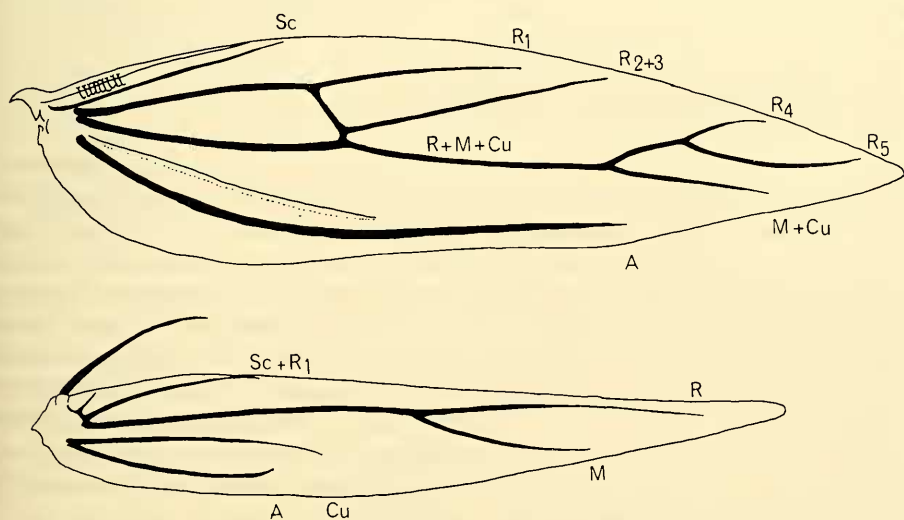


Fig. 22. *Fomoria* sp. Wing venation.

with scales darker at the tips; fringe brown or grey and marked apically with a band of wing scales; markings either absent or in the form of silver fasciae or patches. Hindwings: narrow and lanceolate, brown. Legs: brown or ochreous, sometimes annulate with paler areas; proximal pair of spurs on hind-tibiae below the middle.



Male genitalia: vinculum always ring-shaped; tegumen fused with vinculum dorsally, extending into long, bluntly pointed pseuduncus. Uncus sclerotised with spatulate medial projection. Gnathos with medial arms fused to form posterior central boss or tapering process, rarely with anterior medial projection, lateral arms usually broad and straight. Saccus weakly bilobed. Valves tapering markedly and in Nearctic species with large dorsal spine. Transtillae broadly W-shaped; transverse bars continuous. Juxta present in Palaearctic species as complex, heavily sclerotised plate; absent in Nearctic species. Aedeagus: regular or weakly flask-shaped, usually equal to length of capsule; vesica usually adorned with small denticles and with a complex plate of minute papillae; several pairs of heavily sclerotised, sometimes elaborate, cornuti and anellar spines.

Female genitalia: apophyses approximately equal to length of ductus. Colliculum with sclerotised funicular antrum or complex plates. Ductus denticulate and with spiral accessory duct and sac. Bursa copulatrix: large and variously pectinate; signum double, comprising weakly sclerotised, linear, reticulate patches.

Mining habit: leaf mines; larvae often recorded as pupating within the mines.

Generic differential diagnosis. See page 63.

### ***Fomoria pteliaeella* (Chambers) comb.n.**

(figs. 9, 23, 24)

*Nepticula pteliaeella* Chambers, 1881: 137; 1882: 276.

*Nepticula pteliaeella* Chambers; Dyar, 1903: 546.

*Nepticula pteliaeella* Chambers; Braun, 1917: 168.

*Nepticula pteliaeella* Chambers; Braun, in Forbes, 1923: 86.

*Nepticula pteliaeella* Chambers; McDunnough, 1939: 107 (no. 9721).

Description. External features: ♂. Head: palps greyish; antennae dark grey; tufts on front of head and vertex brown; eye-caps shining white; collar very dark brown. Thorax very dark brown to black, strongly iridescent silver. Abdomen dark brown with scattered gold reflections above, shining metallic grey beneath. Forewings: ground colour of dorsal surface dark brown with bronze reflections, fringe greyish brown, shining silver at apex, with an apical band of dark brown wing-scales; basal patch on dorsal margin, silver, followed by a single antemedial fascia, shining silver and widening on dorsal margin, two marginal streaks, postmedial, almost touching in the middle, both shine silver but have dusted appearance when viewed from certain angles. Hindwings: ground colour and fringe greyish brown, shining metallic grey. Legs dark brown with metallic grey reflections, yellowish behind (fig. 9).

Female. As ♂ except for a pair of convex external pockets ventrally on the third abdominal segment, medial in position.

Wing expanse: ♂: 4.0—5.0 mm (8 specimens); ♀: 3.8—5.4 mm (11 specimens).

Genitalia: ♂. (fig. 23). Pseuduncus with a single tapering lobe and associated sclerotisation with a medial spatulate process as in fig. 23a. Gnathos: an inverted V as in fig. 23a; transverse ventral plate with a large, pointed medial process; dorso-lateral arms broad and straight. Vinculum: triangular as in fig. 23a; lateral arms

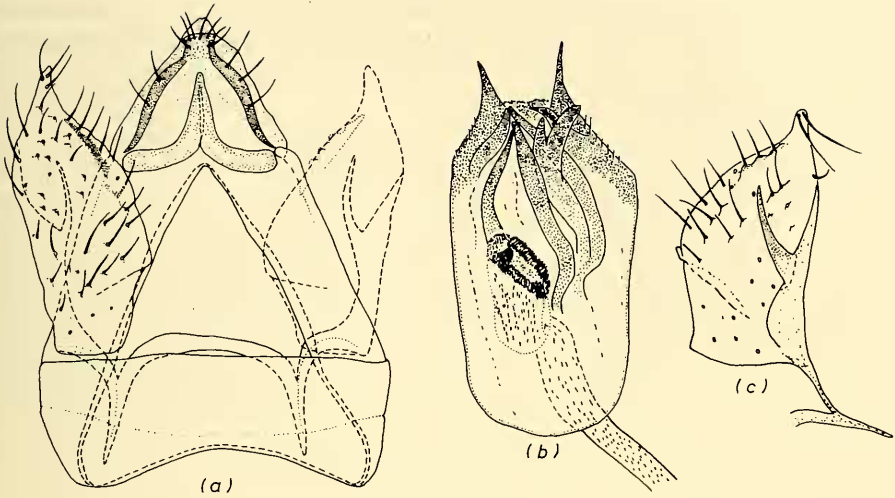


Fig. 23. *Fomoria pteliaeella*. Male genitalia. a, genital capsule; b, aedeagus; c, valve.

very broad; ventral plate broad. Saccus narrower than the ventral plate, weakly bilobed. Valves not reaching pseuduncus, tapering markedly and with dorsal spine arising medially not reaching beyond the cuiller as in fig. 23c. Transtillae: W-shaped as in fig. 23a; lateral arms short and narrow; ventral arms long, reaching beyond the ventral plate; transverse bars fused. Aedeagus: broad and regular, shorter than length of capsule; vesica with between five and ten very large cornuti and with a plate of minute papillae as in fig. 23b; anellus comprising a pair of broad lateral spines.

Female (fig. 24). Colliculum with a weakly sclerotised funicular pocket as in fig. 24a. Ductus bursae short and narrow with accessory duct arising medially, becoming spiral distally. Bursa copulatrix: large and covered with short, heavily sclerotised chains of pectinations proximally and heavily sclerotised denticles distally, both of which are on striations of the bursa; signum double comprising a pair of long cellular patches, unequal in length as in figs. 24a and b. Anterior apophyses very long and slightly arcuate distally. Posterior apophyses straight and narrow, not reaching the anteriores.

Host plant: *Ptelea trifoliata* (Hop-tree).

Mine: An upper surface ophionome.

Diagnosis. Differs externally from *hypericella* in the strongly iridescent nature of the thorax of *pteliaeella* and in the absence of wing markings in *hypericella*. Both male and female genitalia resemble those of *hypericella* but may be separated by the pointed median process of the gnathos, the relatively shorter aedeagus and the larger and more numerous cornuti at the phallotreme in *pteliaeella*; the females differ in that the funicular antrum lacks the heavy sclerotisation and the lance-shaped plate found in *hypericella*.

Discussion. Obviously related to *hypericella* in the overall form of both male and

female genitalia and particularly in the large dorsal spine of the valves. First described by Chambers (1881) from larva and mine and then later (1882) from the adult he had reared.

Distribution. USA: Ohio.

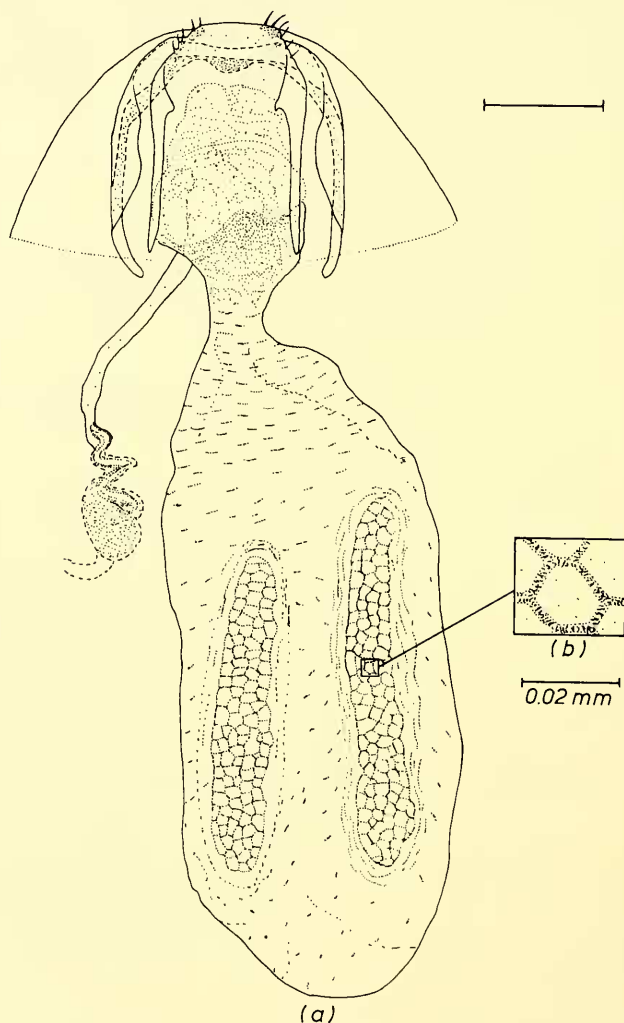


Fig. 24. *Fomoria pteliaeella*. Female genitalia. a, genitalia; b, detail of signum enlarged.

Material examined. In ANS: Ohio, Cincinnati; on *Ptelea trifoliata*; 1 ♂, 9.vi.1917, 2 ♂ 3 ♀, 7 ex., 11.vi.1917, 1 ♀, 19.vi.1917, B.736 (Braun). Ohio, Clermont County; on *Ptelea trifoliata*; 1 ♂, 5.vi.1916, 1 ♂, 2.v.1921, 1 ♂, 2.v.1921, 1 ♂, 21.v.1921, 2 ♂, 1 ex., 23.v.1921, 1 ♂, 24.v.1921, 3 ♂, 3 ♀, 25.v.1921, 1 ♀, 26.v.1921, B.736 (Braun). In USNM: Ohio, Clermont County; on *Ptelea trifoliata*; 2 ♀, 25, 26.v.1921, B.736 (Braun). In Zoölogisch Museum, Amsterdam. Ohio,

Cincinnati, 3 ♂, 11.vi.1917, B.736 (Braun). Mines examined: in ANS: Ohio, 1 mine on *Ptelea trifoliata*; date not certain, B.736 (Braun).

Biology. Egg. Laid on the lower surface of the leaf and, in the single case examined, next to a vein.

Mine. An upper surface, much contorted linear mine with rather undulating margins in the later portion. The frass is evenly scattered across the breadth of the mine in the earlier portion, but is a continuous central line distally.

Larva. Emerges on the upper surface of the leaf prior to pupation.

Pupa. Cocoon dark brown (Braun) or yellowish green (Chambers).

Voltinism. Braun (1917) reports that larvae may be collected in July, August and September, and that the species is bivoltine. The material examined here represents a single generation, the adults being on the wing in late May and June. This agrees with Chambers' findings.

***Fomoria hypericella* (Braun) comb.n.**  
(figs. 10, 25, 26)

*Nepticula hypericella* Braun, 1925a: 17.

*Nepticula hypericella* Braun; McDunnough, 1939: 107 (No: 9768).

Description. External features: ♂ ♀. Head: palps grey; antennae greyish brown, faintly annulate with paler areas; tuft on front of head orange-ochreous, vertex darker; eye-caps shining white, sometimes shading to fuscous distally; collar pale

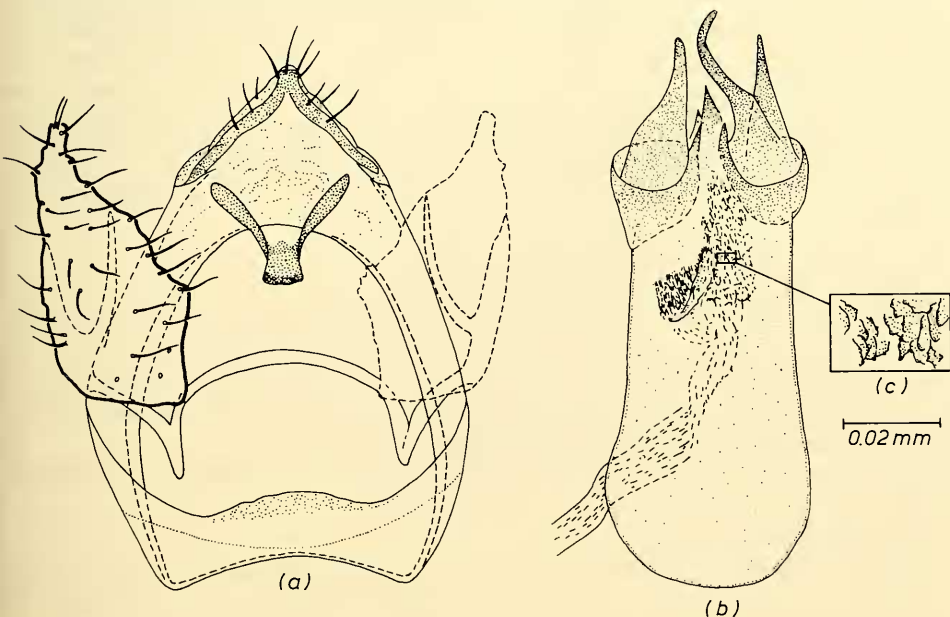


Fig. 25. *Fomoria hypericella*. Male genitalia. a, genital capsule; b, aedeagus; c, detail on vesica enlarged.

ochreous. Thorax and abdomen dark brown, thorax with greyish lustre, abdomen shining metallic grey beneath. Forewings: ground colour of dorsal surface greyish brown, each scale darker at the tip, various reflections but predominantly grey and bronze; fringe greyish shining metallic grey, with an apical band of dark brown wing-scales. Hindwings: ground colour and fringe brownish, shining metallic grey. Legs greyish brown, paler and shining metallic grey behind, tarsi faintly annulate with buff (fig. 10).

Wing expanse: ♂: 4.0—4.8 mm (8 specimens); ♀: 3.8—5.0 mm (9 specimens). Holotype: 5.0 mm.

Genitalia: ♂. (fig. 25). Pseuduncus with a single, tapering lobe and uncus sclerotised with a medial spatulate process as in fig. 25a. Gnathos: an inverted V with transverse ventral plate forming a broad and flat central boss; dorso-lateral arms short. Vinculum: lateral arms broad; ventral plate narrow, with a medial convex expansion. Saccus very narrow, bilobed. Valves just reaching the pseuduncus, tapering markedly into a broad point, with dorsal spine arising medially just reaching cuiller as in fig. 25a. Transtillae: broadly W-shaped as in fig. 25a; lateral arms short and narrow; ventral arms blunted, not reaching the ventral plate. Aedeagus: flask-shaped, approximately equal to length of capsule; vesica with cornuti as many small spiculate plates and with a comma-shaped plate of minute papillae; anellus comprising two pairs of very large tooth-like spines and single spines.

Female (fig. 26). Colliculum with a weakly sclerotised funicular antrum and a lance-shaped chitinous plate. Ductus bursae short and as broad as the bursa copulatrix. Accessory duct arising from the area of sclerotisation, spiral distally. Bursa copulatrix: long and narrow with short heavily sclerotised chains of pectinations proximally and heavily sclerotised denticles distally, both of which are on striations of the bursa; signum double, comprising an equal pair of long, cellular patches as in figs. 26a and b. Anterior apophyses long and narrow. Posterior apophyses straight and narrow, approximately equal to length of the anteriores.

Host plant: *Hypericum prolificum* (St. John's Wort).

Mine: An upper surface ophionome.

Diagnosis. The uniform colour of the forewings and the absence of any markings separate this species from *pteliaeella*. The quadrate median process of the gnathos, the larger aedeagus and the more complex anellar projections in *hypericella* distinguish the male genitalia from those of *pteliaeella*, while the more heavily sclerotised antrum of *hypericella* separates the females.

Discussion. Originally described from holotype and 18 paratypes all reared by Braun.

Distribution. USA: Ohio.

Material examined. ♀ Holotype: USA: "B. 1103; Eastwood O., i. 13.viii.1923, Annette F. Braun; Type; *Nepticula hypericella* Braun Type"; on *Hypericum prolificum*; slide no. 110—PJNI; in ANS.

Paratypes: in ANS: data as Holotype: 1 ♂, 1 ♀, 6.viii.1923, 2 ♂, 2 ♀, 8.viii.1923, 1 ♂, 10.viii.1923, 5 ♀, 11.viii.1923, 3 ♂, 12.viii.1923, 1 ♂, 16.viii.1923, 1 ♀,



20.viii.1923, B.1103 (Braun); slide nos: 111—PJN, 112—PJN, 113—PJN, 114—PJN, 115—PJN.

Mines examined: In ANS: Ohio, Eastwood; 2 mines on *Hypericum prolificum*; 20.vii.1923, B.1103 (Braun).

Biology. Egg. Laid on the lower surface of the leaf, adjacent to the midrib.

Mine. A very long, slender tract on the upper surface. The frass is deposited centrally as a continuous line in the early portion but later more generally scattered.

Larva. Emerges on the lower surface of the leaf. Braun reports that occasion-



Fig. 26. *Fomoria hypericella*. Female genitalia.

ally pupation occurs within the mine, with the anterior edge of the cocoon placed at the slit in the leaf surface.

Pupa. Cocoon pale brown in colour.

Voltinism. Univoltine in Ohio, the adults being on the wing in August.

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